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SUNLIGHT AS HEALER

A POPULAR TREATISE

BY

DR. F. THEDERING

With Foreword

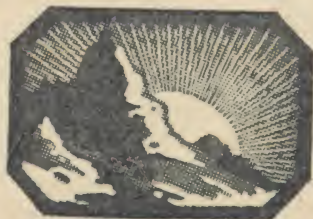
by

Sir William Arbuthnot Lane,

Bart., C.B., M.S.

(President of the New Health Society)

MORE SUNLIGHT!

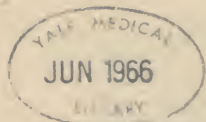


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Foreword

By

SIR WILLIAM ARBUTHNOT LANE, Bart., C.B., M.S.

(President of the New Health Society).

WITH the widespread interest which is being shown at the present time in all measures which have as their aim the furtherance of a higher standard of Health in this country, and particularly in the treatment of diseases such as Rickets and Tuberculosis now so widely being treated by Light, both natural and artificial, the present volume, which is a translation from the original work of one who has devoted many years to treatment and to research in this important branch, should be read with interest and advantage.

In Britain we have awakened to the fact that Light will cure and also obviate some of the scourges from which we suffer. It has been proved in our own hospitals and sanatoria, and we have observed the wonderful improvement wrought in cases of deformity in which malformation has given place to the normal and healthy.

Why, if Light can do all this, should we as a Nation not see to it that all shall be allowed to grow up in our midst with the opportunity of securing health and the cure of their ailments?

Better housing, cleaner milk, and more wholesome foods are some of the problems which we must solve before we can raise the general health standard. Many there are who are working for those ends.

Philanthropic measures are engaging the attention of Parliament, and we have several Societies which are doing good work in the same direction. Some time must necessarily elapse before the public derive the full benefit of this method of treatment, but in the meantime we must pursue the search for more knowledge of this wonderful, powerful and tonic healer—"Light."

There is much valuable information in this little book, and its contents should prove of inestimable value to those interested in this most important subject.

WILLIAM ARBUTHNOT LANE.

LONDON.

April, 1926.

Preface.

HEALING by light, known to mankind through the ages as the source of health and happiness, but only in modern times developed into a system of therapeutics through the genius of Finsen, Rollier and Bernhard, ought to be universally known. This is equally true as regards healing both with natural and artificial light.

Particularly in the campaign against tuberculosis, light has proved itself our most valuable and effective weapon. The recent increase of two grave dangers to public health—scrofula and rickets—both of which are particularly responsive to treatment by quartz light, has necessitated extensive discussion of the light treatment of these two diseases. Special mention has been made of the author's recent conception of quartz light treatment in the form of light-douches, which is of particular importance for the treatment of the poorer strata of our population.

It is hoped that this little work may extend the knowledge of healing by light far and wide.

D. F. THEDERING.

OLDENBURG.

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Part I.
General.

Chapter I. Historical.

Knowledge of the healing power of sunlight goes back to prehistoric times, and evidence can be produced in every period of history that among both primitive peoples and advanced civilizations full use has been made of the vivifying power of the orb of day in curing disease. Not only positive solar treatment, by which is meant treatment by the use of the sun's spectrum in whole or in part, but also negative irradiation, so to call it, consisting in the exclusion of certain colours, has become known through usage in the simple treatments of earlier times. Thus we know, for example, that in small-pox the dreaded purulent stage can be avoided by keeping the patient constantly in darkness or in red light ; the blue and violet rays, which are abundant in diffused daylight, have, in particular, a stimulative and irritant action which causes the watery content of small-pox pustules in the initial stage to turn septic. If patients are kept in a red room, following Finsen's procedure, prevention of this secondary septic stage is achieved and the pustules heal without leaving scars. In popular consciousness, however, the simple knowledge has existed from earliest time, that red curtains should be hung round the bed of anyone ill with small-pox, scarlet fever, or measles ; an interesting example of the extent to which popular experience was the precursor of scientific theory.

In the history of the Egyptians, Greeks and Romans, positive evidence of attempts at healing by solar treatment is available.

Hippocrates (460-377 B.C.) extols the exsiccative action of sunlight. Herodotus gives extensive instructions for use of the sun-bath, emphasizing its effect in strengthen-

ing the muscles and bracing the nerves. Antyllos (300 B.C.), of whose writings only fragments remain, describes most exactly the action of sunlight ; the passage reads :—

“ Many set themselves in the sunlight, partly anointed, partly not ; some recline, others sit, many walk or run about. Let those who lie stretch themselves out in the sunlight on a mattress, a skin, in the sand, or in the open sun ; the sun’s rays, which should be used with caution when not anointed, increase the internal transpiration, evoke perspiration, check increase in girth, strengthen the muscles, and reduce fatness ; thus also the soft swellings (*œdemata*) of dropsical persons are reduced. Breathing, however, is increased and quickened by the rays, which therefore invigorate the narrow-chested and such as breathe with stiff necks. They are moreover advantageous to those who suffer from constant debility, since they strengthen them and harden them against disease. It is, however, necessary first to lighten the body, as the sun’s rays are harmful to the head if the bowels are not emptied previously. Used in conjunction with anointment, the sun’s heat achieves the same effects ; the body is however more dried up, being in a manner roasted on the ointment, so that the sunburn is more superficial ; moreover, in this case the solar heat acts less through internal transpiration, having a kind of roasting action through which the flesh is made firmer. Those who sun themselves sitting or standing still are more strongly burned than those who walk or run about. Reclining on a mattress is not very beneficial, and causes pains in the head. On the other hand, sun treatment stretched on a skin is most advantageous, particularly for those who suffer from dropsy, sciatica, diseases of the kidneys, elephantiasis, swellings

of all kinds, abdominal diseases, or chronic ailments of the bladder. This is also similarly beneficial for such as are paralysed, for women with diseases of the womb and especially for those afflicted with the white flux. The skin should be large, steeped in oil, spread over a thin surface of sifted sand. The patient should at first lay himself thereon where it first becomes warm, his head bound with unbleached linen. He must remain a long while in this attitude ; when his body is thoroughly warmed throughout, he should change his position and turn over, then lay himself on the other side and so rest again, repeating this changing and turning many times."

Without question Antyllos was a good observer, whose observations withstand even modern criticism.

Among Latin authors, Celsus, Pliny the Younger, and Cicero, describe attempts at solar healing among the Romans. The flat roofs of the southern houses were esteemed as solaria.

In modern times Rickli, a Swiss, must be first named for his systematic and successful use of sun baths in treating metabolic disturbances ; also Dr. Sorgo, the laryngologist, who treated laryngeal tuberculosis by sunlight, radiated on the affected area in the throat by means of a reflector.

Sunlight treatment has, however, recently been advanced to a large structure on a scientific foundation by the work of two Swiss doctors, Dr. Bernhard, of Samaden, and Dr. Rollier, of Leysin. Particularly in the external, so-called surgical forms of tuberculosis, both doctors have attained such excellent and gratifying results that the operative treatment of these diseases has almost entirely yielded place to the irradiative. As the mountain sunlight is of different spectral composition to that of the plains, being

richer in short-waved, ultra-violet rays, scientific theory was at first disposed to impute efficacy in curing tuberculosis only to Alpine sunlight, and to deny it to that of lower regions. This assumption was happily not confirmed in practical experience. Dr. Felten-Stolzenberg, of Wyk (Föhr), was the first to demonstrate that seaside sunlight is also able to cure external tuberculous inflammation, owing to the similarity in composition of sunlight at the sea and in the Alps. In the last few years, however, the experiences of many doctors at inland lowland towns (Prof. Bardenheuer, of Cologne ; Prof. Vulpius, of Heidelberg ; Dr. Schmerz, of Graz ; and the author in Oldenberg) have shown that sunlight in the plains, if to a lesser degree, is none the less efficacious to an astonishing extent in external tuberculosis, and that it is by no means necessary for tuberculous patients to undertake expensive journeys to the Alps or the seaside to obtain the benefit of sunlight treatment. The author has therefore repeatedly expressed his scientific conviction that *sunlight treatment can successfully be carried out in town or country, during any season, at any spot where the sun shines.*

Only one hindrance presents itself here : the poverty of our northern climate in sunshine. In the Alps, and in the South especially, the number of sunny days is vastly greater than in our cold and misty island climate. Here we often have to wait for weeks to see a gleam of sunshine. Finsen, the founder of modern light treatment, had to change from natural to artificial sources of light ; and, like him, others have been compelled to devise artificial illuminants to make good the deficiency in natural sunlight.

In this connection Dr. Arons, of Berlin, in 1892, made a discovery of immense value. He found that an electric

current passing between two mercury poles in an evacuated quartz tube formed a mercury vapour arc very rich in short-waved ultra-violet light.

Prof. Kromayer was the first to conceive the introduction of this light as a curative agent in medical practice. He devised the Kromayer lamp named after him; which, however, is only suitable for local treatment.

An apparatus for general irradiation was devised by Dr. Bach of Bad Elster, who had the brilliant idea of using the quartz light, rich in ultra-violet, in constructing an illuminant which should reproduce closely the Alpine sunlight. The outward appearance of this lamp, known as the "Artificial Alpine Sun," and manufactured both as a stand or hanging lamp, can be seen from the accompanying illustrations. (See Figs. 2 and 4).

II. Sunlight.

Light is a sensation of brightness aroused in our eyes by the stimulation of electromagnetic vibrations in the ether, to which certain elements in our nervous system respond. Despite outward appearance, light is, however, not an elemental but a composite entity. By means of a prism the ether vibrations of sunlight are unequally refracted, and arranged in order according to their velocity and wave-length, forming the magnificent colour band of the spectrum : red, orange, yellow, green, blue, indigo, violet.

From red to violet the wave-lengths decrease, while the rate of vibration increases. The blending of all colours of the spectrum produces white ; if a body absorbs all colours except one, yellow or red for example, it will appear of the colour in question, while mixed tints arise from absorption of several spectrum colours.

Sunlight also contains a large number of vibrations for which no perception exists in our ocular senses, and which are therefore invisible. The visible spectrum is composed of wave lengths from 7600 A.U. (red) to 3970 A.U. (violet), but to the right of the violet band is a group of very short waves, the ultra-violet rays, extending in sunlight to 3000, and in quartz light as far as 1800. A corresponding group occurs left of the red, also invisible : the infra-red rays, longer than the visible red.

The ether vibrations of sunlight not only give us the sensation of colour ; they also carry special forms of energy. The long-waved rays (red and infra-red), carry heat, and we therefore term red a warm colour. Blue, on the other hand, has little heat and is a cold colour. Red has no action on the silver emulsion of a photographic negative,

while blue causes instantaneous blackening through liberation of silver ; red is chemically inactive, blue active. As regards mental effects, red is a " warm," exciting colour, blue a restful, " cold " colour. The activity of living cells is greatly increased by blue, but little affected by red ; red is biologically an inactive, violet an active colour. On a flat surface, red stands out while violet recedes ; from the artistic point of view, red is therefore accounted a positive, violet a negative colour. Blue arouses inflammation of the skin ; red subdues it.

From these contrasts, it will readily be seen that red and blue are " antagonistic " to each other in their effects. Green occupies, from its wave length and vibration period, an intermediate position. Green is on this account the colour most found in nature ; the living plant cells, whilst incorporating the rays left and right, and utilising their various physical, chemical, and biological energies, reject the green as useless. Equilibrium between the two halves of the spectrum gives the colourless appearance of bright daylight, while green imparts to nature its restful effect upon our eyes.

III. Quartz Light.

Quartz light is different from sunlight in many respects. Whilst the colours in the sunlight spectrum merge into each other, in that of quartz light they are divided into distinct lines. The former is termed a band spectrum; the latter a line spectrum. Quartz light is totally deficient in red, and begins at yellow; but whilst sunlight extends on the right end of the spectrum only as far as the end of the near ultra-violet (3,000 A.U.), quartz light goes even beyond 1,800 A.U. The latter is therefore richer by about 1,500 to 1,800 A.U. than sunlight in these further, short-waved ultra-violet rays.

These rays have a strongly stimulative and inflammatory effect on the skin and eyes. They are totally lacking in natural sunlight, in which the milder inner ultra-violet (4,000-3,000 A.U.) counterbalances the red. Red is, as stated above, a neutraliser of ultra-violet; and a skin-inflammation caused by ultra-violet cannot be better treated or quicker healed than by red light.

These red rays are, however, entirely lacking in quartz light, and its double danger for skin and eyes can be easily perceived, arising both from its excess of irritative ultra-violet and its total lack of the counteracting red rays. From this reason a short exposure to the quartz lamp is sufficient to burn and blisten the skin or produce serious conjunctivitis of the eyes.

IV. The "Artificial Alpine Sun."

The quartz lamp, the so-called "Artificial Alpine Sun," is a double hemisphere of highly polished aluminium; the lower shell can be rotated inside the upper by means of a handle, enabling the lamp to be opened and closed as desired. The upper half is the casing for the reception of the burner, made in quartz. The latter is pumped to a high degree of evacuation, and contains mercury. Connection of the electric current lights the burner, causing a fine cloud of mercury vapour inside the tube, which conducts the current and is thereby heated to incandescence. This is the mercury flame arc, the quartz light. It is bluish green in colour, and yellow, green, and blue are strongly illuminated by the light, while red is subdued to a livid, uncertain hue. The veins appear bluish under a greenish skin in the light, with an almost ghostly effect.

The quartz lamp is constructed in three forms: the suspension model; standard model; and the box-shaped reflector lamp for use in large light-bath establishments. The two former are specially suitable for medical and private use.

The quartz light can be supplemented with red rays by means of a ring of light bulbs (the Hagemann ring), whilst the shorter ultra-violet can be extracted by hanging a blue screen, the Uviol Filter, before the lamp. A further auxiliary to the lamp is the Sollux Lamp of Dr. Heusner, which also gives an admixture of red rays.

The addition of heat rays is most acceptable to the patient, who is exposed naked to the light, particularly in cool weather; the curative effect of the lamp does not appear to be increased thereby. Sollux Lamps and Hagemann rings increase the cost of treatment, and can be dispensed with; the same applies to the Uviol Filter.

V. Natural or Artificial Sunlight?

The lack of sunlight in our Northern climate soon drew medical attention to the idea of supplementing natural by artificial sunshine. No illuminant appeared more suitable for this purpose than the quartz lamp. When Rollier's successes in treating external tuberculosis by Alpine sunlight began to win world fame, the discoverer, and with him the rest of the scientific world, was disposed to attribute the wonderful results solely to the high content of ultra-violet in Alpine sunlight. It was only a step from this to the idea of constructing an artificial source of light for use in the lowlands which should produce these ultra-violet rays in high intensity. Dr. Bach, of Bad Elster, thus devised the quartz lamp, named by him the "Artificial Alpine Sun."

The important question arises, *whether artificial light can replace natural sunlight, and which of the two is preferable.*

Every imitation of nature must remain incomplete. Exact chemical and physical analysis can certainly show us the parts, the materials from which natural phenomena are built up, but we can never entirely reproduce the mysterious natural creative processes*. We cannot construct from the elements the quickening intimate interconnection and unity.

And so natural sunlight has inestimable advantages over artificial. The shorter ultra-violet rays, which render it impossible to stay under quartz light without precautionary measures, are not found in sunshine; and although the sun generates a certain amount of invigorating ozone

* "Die Teile habt Ihr in der Hand
Fehlt leider nur das geistige Band."

in the air we breathe, it does not develop the quantity of active oxygen which soon renders the atmosphere of a quartz light treatment room unbearable, and causes headache and malaise. It is this factor which makes it so important to have thorough ventilation when the quartz lamp is in use. A sun bath in the open connotes the benefits of fresh air for hours on end, which are denied in an indoor radiation room.

In quartz light, again, there is not the balance between red and violet which is so beneficial to eyes and skin in natural sunlight. The living cells of men, beasts and plants are adjusted to this happy combination of physical, biological and chemical properties, which is the basis of our life.*

Although it cannot be denied that mountain sunshine has its very great advantages for irradiation treatment, it is on the other hand wrong to suppose that it alone has curative power. Neither the ultra-violet nor the red rays are the exclusive agents of healing. The truth lies between: *the entirety of the ether vibrations of sunlight; the combination of red and violet, of warming and cell-stimulating rays, is the secret of sun healing. For this reason sunlight in the plains is also potent, and a sun bath can be taken anywhere where the sun shines and at any season.*

The advantages of the mountains consist merely in the freedom of the air from dust, the greater number of sunny days in the year, and the movement of the air, which does not allow the skin to become sunburnt easily. These advantages are possessed also by sunlight at the seaside. A further advantage in comparison with the plains is the radiation of the body from all sides through reflection

* "Aus dieser Erde quillen meine Freuden und diese Sonne scheint meinen Leiden."

of light from the mountain snow or the waves of the sea ; in the plains, owing to the absorption of all but the green rays by plant life, this reflection does not occur. The abundance of light, therefore, is greater at the sea and in the Alps ; it should, however, be possible to imitate this to advantage by lying on a white sheet in the open.

The quartz lamp has, however, its own peculiar value. Its greatest advantage lies in the fact that its light can be turned on at any time desired. We are deprived of sunlight during long winter months, and in the summer the sun is only too often hidden by cloud for weeks together in our northern climate. Here we find a most excellent substitute in the quartz lamp, although the composition of its light, entirely different from sunlight, requires a correspondingly different application. This is discussed more closely in a special section (Irradiation Technique, p. 51).

The objections which have been raised to quartz lamp treatment, and the doubts cast upon its efficacy, have been refuted thousands of times in practice. The most frequent argument is that a source of light so entirely different from the sun cannot possibly achieve the same results. Experience teaches the opposite ; our blood has the property of transforming rays, and is able to equate the light from a quartz lamp to natural sunlight, different as it is in spectral composition, through changes in the wave lengths. The difference in pigmentation of the skin caused by sunlight and by the quartz lamp is also adduced as an argument against the latter. The browning after irradiation is a protective function of the skin against the dangerous ultra-violet rays. Consequent on the fact shown above, that each illuminant has its own distinctive ultra-violet spectrum, it is clear that each must evoke its own form of pigmentation. This argument, therefore, is also in-

valid ; in any case, the significance of pigmentation as a factor of importance in healing is much disputed.

The amount of strongly stimulative rays in quartz light is, however, a great advantage in all diseases where it is necessary to evoke a certain degree of irritation on the skin, as in baldness and scrofulous eruptions. In this respect the artificial is much superior to natural sunlight.

Classified according to their value in treatment, the various sources of light would appear in order as follows :—

Sunlight in the upper mountains.

Seaside sunlight.

Sunlight in the foothills.

Sunlight in the plains.

“ Artificial sunlight ” (Quartz light).

VI. Light Baths or Light Douches?

The general rule for a quartz light bath prescribes a commencement with very short irradiations of one to two minutes, and then extending the time, avoiding sunburn, to a quarter or half an hour. The body should be radiated equally on all sides. When the skin has been bronzed, showing that a strong formation of pigment in the basal cell layer has taken place, it is able to stand irradiation for any time desired without fear of burns, and the light bath can, and should, be extended to three-quarters or a full hour. The author has followed this rule in treatments for years.

He soon observed, however, that the treatment quickly came to a dead end, and the cure made no further progress. The cause is obvious; in consequence of the superabundance of ultra-violet rayed on the skin during these protracted baths, the body is compelled to surround itself with a thick covering of pigment which shuts out the rays like a coat of armour, and the effect of the light bath becomes nil. Prof. Rost, of Freiburg, observed the same. Whilst this doctor, however, recommends a break of 6 to 8 weeks in treatment after the first 6 weeks, in order to give the body time to rid itself of the excess pigment, the author considers it better so to restrict the duration of the single light baths, that strong pigmentation does not occur.

The effect of a quartz light bath bears the same relation to a sunlight bath as does a douche to a bathe. An abundance of ultra-violet light beats on to the skin in the space of a few minutes, which the blood cannot possibly utilise in so short a time. Just as the effect of a water douche would be reversed to the opposite of that desired if pro-

tracted to a quarter of an hour, a quartz light bath, unlike a sunbath, should not at the outside exceed 10 to 15 minutes. The aim is a short, sharp stimulation of the metabolic system, which should as far as possible be repeated daily. Only in cases where through external causes it is not feasible to take the light bath more than once or twice a week is it permissible to extend the duration to half or three-quarters of an hour. The body then has time to dispose of the excess of ultra-violet. *Years of experience have taught me that the effect of such frequent but short ultra-violet douches is more favourable than that of protracted light baths.*

The conception of the quartz light bath as an ultra-violet douche is of the greatest general importance. The cost of such a douche is, of course, much less than that of an artificial light bath lasting an hour ; the saving can be easily imagined. It is an incomparable advantage of the quartz lamp that it opens up the possibility of short but effective treatment in the form of light douches.

VII. Dangers of Natural and Artificial Light Baths.

There need be no fear of injury from a sunbath, provided certain precautions are observed ; the skin and blood must be gradually accustomed to the sunlight. If one exposes oneself for the first time to midday sunlight in the height of summer, for an hour or longer, the natural consequences will be sickness, headache, general malaise, and sunstroke ; especially if the head is not covered. The procedure to be followed is laid down in this book ("Irradiation Technique," p. 51).

Nervous subjects, and sufferers from heart or lung diseases, should only take sunbaths under medical advice and supervision.

This is especially true of "artificial sun" baths. The risks of burning the skin and severely injuring the eyes are very great with this apparatus if carelessly used. *The Artificial Alpine Sun can admittedly be a blessing in any household, but the doctor's advice should be taken.*

Sun baths or artificial light baths should not be taken shortly after a heavy meal, when food is in process of digestion.

VIII. General Curative Effects.

The action of sunlight, stated in most general terms, is the animation of nature. When the genial and radiant orb of day leaves us at the beginning of winter, the realm of nature sinks into a condition of lifeless torpidity. In spring, however, the myriad sleeping seeds are quickened by the stimulation of light to blooming, smiling life. A plant kept in darkness grows colourless, flaccid, and stunted, but in the light it soon regains colour and unfolds bud, leaf and flower in joyous life. *So is it with the human flower, which, in Rousseau's splendid phrase, needs sunlight most of all the flowers.* Every flower, as Heine says, looks up to the sun ; even bacteria, floating in a liquid, are drawn upward by light, a phenomenon known in scientific terms as heliotropism.

The cheering, elevating influence of sunlight on the spirits is universally known. The effect of a burst of sunshine after the gloom of winter, or a gray rainy spell, is like a mental deliverance. We catch something of this cheering effect of light too, when the lamps are lit at the end of a dull day and throw their glow around ; and how often do gloomy thoughts find place in our minds during darkness, which vanish like mist at the light of dawn.

The sun even exercises a certain influence on the psychology of nations ; hence the fanciful imagination and love of colour characteristic of southern peoples, while the spirit of the Northerner is governed by gloom and superstition.

From the medical standpoint, this gladdening effect of sunlight is of great importance, since nothing can be more salutary in disease than a cheerful and optimistic state of mind on the part of the patient.

If part of the body, normally clothed, is exposed to glowing sunlight, a superficial reddening and inflammation of the skin, associated with a burning and pricking sensation, will be observed after some time. This is sunburn in its normal form ; stronger grades can lead to blistering of the skin. After some days the red dies down, the skin at the same time drying and peeling. On the brown parts of the body, the face and hands, this phenomenon will not be seen. When the sunburn has disappeared, the part in question will afterwards turn brown through formation of colouring matter in the skin (pigmentation). Light therefore causes pigmentation (bronzing) and the pigment at the same time forms a protection against the inflammatory effect of light. Microscopic investigation shows that the pigment is deposited in the form of dark granules in the basal cell layer of the upper skin, and has therefore the effect of a suit of armour against the darting rays of light. It is known from observation that the red, yellow and green rays do not cause pigmentation, but only the blue, violet, and in particular the ultra-violet. As, however, it is at the same time these rays exclusively which evoke inflammation, we have the interesting fact that the noxious agent itself is the cause of the protective device which renders it innocuous. This is in accordance with Pflüger's teleological law, that every noxious influence acting on the human body is extinguished *eo ipso*. "The cause of any and every need of a living entity is at the same time the cause of the satisfaction of that need."

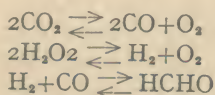
In certain cases of skin disease we make use of the irritative properties of ultra-violet rays in effecting a cure, when it is desired to cause peeling. Quartz light is most suitable for this purpose, owing to its richness in ultra-violet.

The general effect of light, its influence on the blood and metabolism, is based on the power of the rays to penetrate the tissues and, caught by the blood, to be "absorbed," so that the blood is loaded with irradiative energy. The penetrative power of the rays is governed by the law that the longer the wave-length, the greater the penetration, and conversely. The red rays are therefore the most penetrative, and the ultra-violet least, as may be demonstrated in various ways. If the eyes are closed in daylight, a sensation of red light is still experienced, and the hand held before the eyes against the light appears a translucent red. Evidently only the red rays are able to evoke any sensation on the retina after penetrating such thick tissues. Close under the skin, however, a fine-spun web of blood vessels surrounds the entire surface of the body, after the style of a red parasol, though not for the purpose of guarding off the light, but on the contrary to capture the radiant energy streaming in on all sides and to utilise it in the organism. *As, however, the lightest covering shuts off light almost completely, it follows as a primary rule that the entire surface of the body must be exposed unclothed as far as possible to sunlight when a light bath is taken.* A sunbath is therefore something entirely different from the popular conception of enjoying the fresh air.

As to the effects of the radiant energy absorbed in the blood, we know with certainty from numerous blood tests that the oxygen-transpiring area of the blood is increased through augmentation of the red corpuscles and increase in their hæmoglobin content. Just as with plants, so with the human plant; the action of light is to evoke the colouring matter, chlorophyll or hæmoglobin. Both, however, are carriers of oxygen, the most important factor

in the vital process. Light, therefore discharges an enormous influence on the metabolic processes of oxydation, reduction and synthesis. It is known from Quincke and Behring's researches that the oxygen consumption of living cells is vastly greater in light than in darkness, and Hertel discovered that the double spectrum line of oxygen in the blood colouring matter is diminished by the action of light to the single band of reduced hæmoglobin. Light causes therefore on the one hand a disruption of the oxygen molecule from its loose connection with the blood colouring matter, and on the other hand facilitates its fresh combination with oxydisable food substances (protein, carbohydrates, fats). From Bering and Meyer's discovery, the process consists in the activation of certain oxydation ferments existing in the blood (peroxidasis).

The chemical effects of light are related to the processes of photosynthesis, photolysis, photopolymerisation, photo-oxydation and reduction, photo-isomerisation. The part played by light in the assimilation by plants of carbon di-oxide is interesting ; according to Benrath, the process is as follows :



The final product of this chemical transposition is therefore formaldehyde (HCHO), which is polymerised to sugar by the action of light. In the metabolism of plant cells, with the aid of sunlight, a carbohydrate is therefore formed.

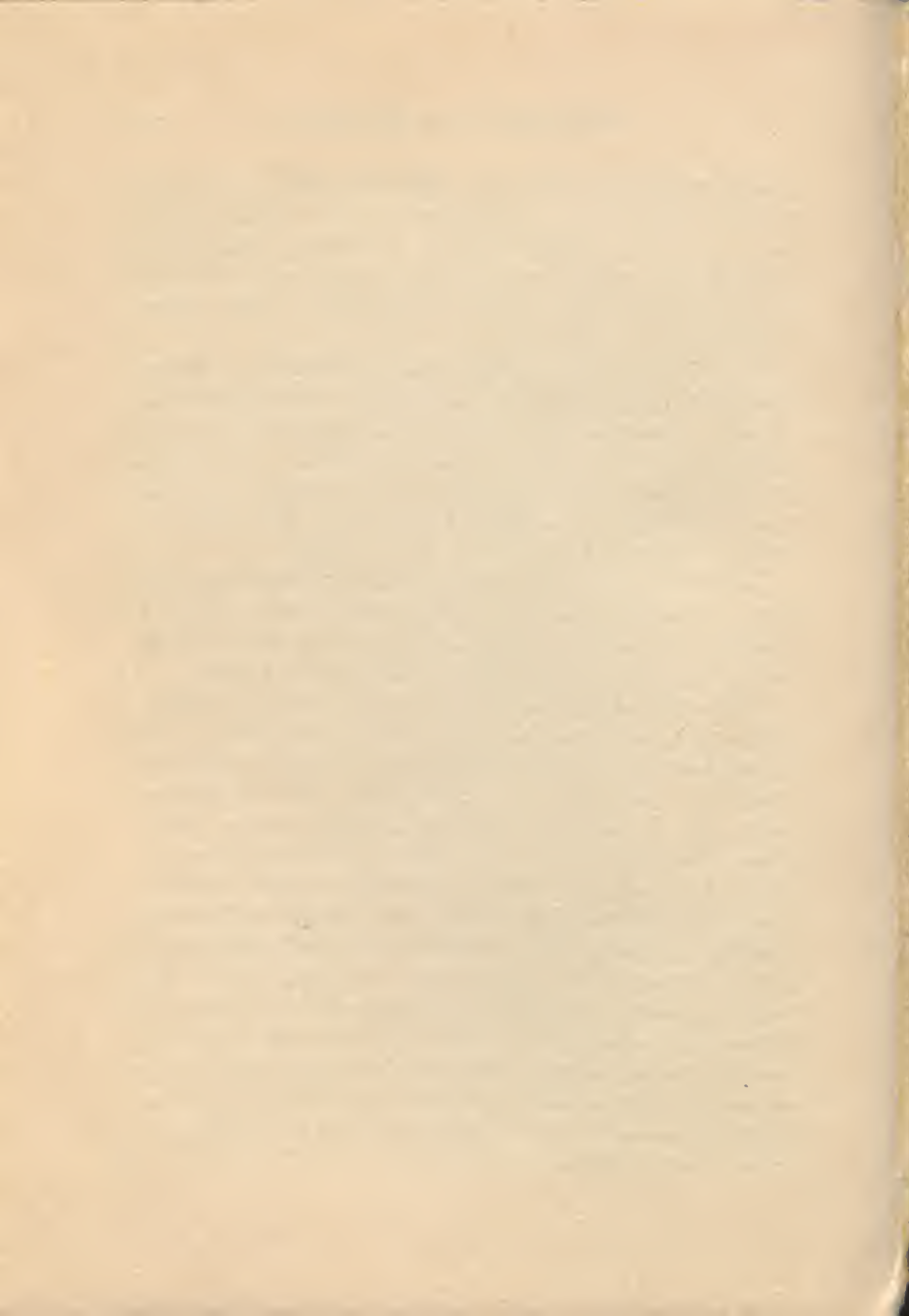
These bio-chemical effects of light are, however, governed by the converse law to that governing the penetration of rays ; *the greatest bio-chemical activity is evoked by the rays of shortest length, and conversely.* In this regard, therefore, the blue and ultra-violet rays have the greatest effect,

yellow and green much less, whilst the red rays are completely inactive. In consequence of this, the blood has at its disposal certain so-called sensitizers, which serve to render the inert red rays utilisable in metabolic processes by transforming the inactive long-waved into short-waved radiations.

The blood-pressure is diminished by irradiation, whether general or local, whilst the excretion of urine is increased. Weight is in most cases increased ; but corpulent, anaemic subjects usually "suffer" a marked diminution of weight in consequence of the increased combustion of fat through the acceleration of oxydative processes. Breathing becomes deeper and slower, and sleep sounder.

This action on the circulatory and assimilative systems gives the simple and natural explanation of the feeling of mental and physical invigoration, and of the excellent hæmatic properties of sunlight in the form of sunbaths.

The extraordinarily strong bactericidal action of sunlight plays no unimportant part in its therapeutic effect. The tubercle bacillus in particular is very quickly destroyed by sunlight. This action is peculiar to the short ultra-violet rays, and is therefore exercised strongly by the quartz lamp, whose spectrum is exceptionally rich in these rays. At 12 inches distance quartz light kills the most resistant bacteria in few seconds, even those that withstand hours of boiling. This has led to modern use of quartz light with great success in the sterilization of drinking water. On similar grounds the airing of living rooms and beds is of great hygienic importance, and the rooms and bed linen of tuberculous subjects particularly should be freely open to the brightest sunlight, in order that all infective germs may be thoroughly destroyed by means of this most effective of bactericidal agents.



Part II.

Special Section.

Special Applications of Light Treatment.

I. Anæmia.

Anæmia is a disorder of the blood-forming organs, leading to impoverishment of the blood in red colouring matter and red corpuscles, which have such important functions as oxygen carriers. The condition mostly affects young girls during the development of womanhood. Pallor, tiredness, menstrual disorders, palpitation, sleeplessness, nervousness; such are the manifold symptoms of the disease. Anaemia lays the train for many serious consequences, among which tuberculosis requires most serious consideration.

Among curative measures, sunlight is foremost, natural sunbaths in the open air playing the chief rôle in treatment. "Artificial Sunlight" (quartz light) also gives magnificent results. Sunlight has the same action on the ailing human plant as on impoverished vegetable life; in both cases it increases the amount of oxygen-carrying matter, blood or chlorophyll. This effect of light treatment is particularly developed when used in conjunction with the usual tonic medicines, iron and arsenic. As sunlight greatly increases the body's consumption of oxygen, special care must be taken that an abundant supply of fresh air is available during treatment.

Light, whether natural or artificial, has this beneficial influence on anæmic humanity, whether the disease be of natural origin, i.e., associated with puberty, or a result of disease, operations, etc.

Among the consequences of anæmia, the persistent headaches, which are so often a bane to anæmic young women, deserve special mention. Treatment with quartz light, with a course of iron and arsenic, cures practically every case in three or four weeks. This success of quartz

light treatment is the more noteworthy from the fact that natural sunlight is unbearable to the sufferer, its usual effect being greatly to increase the pain. This is one of the few cases where quartz light is indisputably better than sunlight.

II. Scrofula.

By the term scrofula is understood a diseased state of the blood and lymph, mostly due to hereditary predisposition. Tuberculosis of the mother in particular is an important causal factor, as is also parental syphilis.

Scrofulous children are easily recognised from their swollen faces ; bloated lips and cheeks give the unfortunate victims their characteristic appearance. The complexion is white and unhealthy in appearance, lacking the colour and freshness of childhood. The neck glands are swollen, and often break out into ulcers ; the membranes of the nose, eyes, and mouth are constantly inflamed and running. Obstinate skin eruptions occur, characteristic of the condition ; the cornea are often attacked by dangerous scrofulous ulcerations. The affection is of serious practical importance as the soil for two frightful diseases ; lupus and tuberculosis.

In treating scrofula, stress is unfortunately too often placed on fighting the symptoms only. Ear specialists are consulted for the deafness which is a feature ; oculists on account of the inflamed eyes ; skin specialists for the eruptions. The most effective treatment, however, is again sunlight, whether in the form of natural or quartz light baths, on account of its tonic action on the blood ; experience has shown that theory and practice are completely at one on this subject. Scrofula commands special medical interest at the present time, being of wide occurrence among children on account of years of malnutrition and neglect, and a grave menace to national health.

It is not easy to draw a line of scientific demarcation between scrofula and other diseases ; in practice, however, we understand under the term a specific disease of the

lymphatic organs, characterised by swellings, of which the ultimate cause is evidently a morbid change in the bodily secretions.

Three forms can be distinguished. The mildest consists in obstinate itching eruptions on the body, particularly in the bends of the elbows and knees. These cases can nearly always be ascribed to hereditary tuberculosis of remote degree, not the parents, but the relatives next removed (grandparents, uncles, or aunts) being tuberculous.

The second form, more severe, is characterised by weeping, ulcerous eruptions, with thick encrustations, usually spreading herpetically from the head over the rest of the body. The cause is not hereditary tuberculosis, but disordered nutrition through deprivation over a long period of the important components of diet, i.e., milk and fat. In Germany cases of this form naturally came daily to the doctor's notice, in the after-war period.

Most serious is the third form, due directly to parental tuberculosis, mainly on the maternal side. It is seen in the unfortunate anæmic children with swollen neck glands and nasal catarrh. In most cases tuberculosis has already set in, the germs being present in the swollen glands of the throat. The significance of this form of scrofula in its specially characteristic manifestation is of such gravity, since ninety per cent. of all cases of lupus can be traced back to this origin. Lupus, as is well known, is a most horrible eating-away of the face, often justly termed "western leprosy." Through eruption of the septic tuberculous gland, the original seat of lupus is formed in the skin of the neck, from which the dreaded disease spreads irresistibly, leaving devastation behind. Scrofulous catarrh of the nasal mucous membrane is the focus for tubercle bacillae in the nose, and thus is caused nasal lupus.

In the campaign against lupus, nothing is more important than a clear recognition of this connection between lupus and scrofula of the nose and throat.

In the treatment of scrofula, emphasis must be placed on improving the general conditions of existence. Healthy, light houses, baths, cleanliness, air and sunlight, removal of tuberculous infection, seaside holidays, and a diet generous in fat and albumen. Scrofulous children particularly need sunlight ; they are anæmic little human flowers which will bloom properly only if transplanted from the cold, dark northern side into a warm, sunny aspect of life. Apart from sun baths, no other means of treatment has proved more beneficial and salutary in scrofula than quartz light radiation.

In administering fat in the diet, that old-fashioned remedy cod-liver oil should not be forgotten.

III. Rickets.

The characteristic of this disease, which mostly attacks children, is deficient calcification of the bones, so that the skeleton is consequently incapable of supporting the body, and the weakened bones have a tendency to bend. Swellings occur in the cartilaginous zone at the ends of the bones of the limbs, in consequence of which the joints appear thickened. The ends of the ribs along the sternum manifest globular swellings, forming the so-called rachitic wreath. From these signs, and from the striking bow-legs of the children affected, the disease is easily recognised.

The causes have not yet been fully explained ; in any case, they must be multiple. Certain it is that rickety children come mostly from poor families ; malnutrition, bad surroundings, lack of proper care and cleanliness, and insufficient light and air may be the source of the ailment. Possibly heredity accounts for many cases.

The significance of rickets lies in the permanent deformation of the bones and joints occasioned thereby ; many life-long cripples owe their malady to this cause.

For many years treatment consisted in the administration of phosphoric cod-liver oil. The modern method is to use in addition to this medicament, which promotes the deposition of calcium in the bones, irradiation with quartz light, which has proved a great success. Three German doctors, Huldschinsky, Riedel and Buchholz, have shown from treatment of many hundred rickety children that from the commencement of quartz light radiation increase of calcification in the bones sets in and the deformations are straightened. The indistinct boundaries in the cartilaginous zone become defined ; X-ray photographs show plainly how the transparent

outlines of the bones of the limbs are darkened progressively week by week on account of the increase in calcium deposit, opaque to the rays. Rickets having become, in modern times, like scrofula, so widespread as to be a menace to the health of the masses, these successes of quartz light treatment are of inestimable importance in social welfare. Natural sunlight treatment also, according to the experience of the writer, is even more effective.

IV. Tuberculosis.

The greatest triumph of modern sun treatment is in the field of surgical tuberculosis. Settlement of the tubercle bacillae on the lungs causes, as is well known, the dreaded "consumption"; if, however, the germs find a footing in the joints, bones, glands or skin, any of these organs may develop its own form of the disease. Such cases are seldom a matter of purely local infection; the cause is rather an escape of tubercle bacillae from some internal source. Purely local external tuberculosis is treated by irradiation with sunlight, quartz light, Finsen lamps, or X-rays; when, however, the malady is only a symptom of general tuberculosis, as is usually the case, general irradiation of the entire body must proceed hand in hand with local treatment. The incredible successes achieved by irradiation treatment in maladies of this description will be better realised from the accompanying illustrations than from any verbal description. Its great advantage over surgical treatment lies also in the fact that light can distinguish between healthy and unhealthy tissue better than the surgeon's knife, and on this account radiation treatment has throughout reached greater success than surgical.

The host of consumptives will naturally look to light treatment with awakened hope and expectation, But in this very regard the physician's special duty is to maintain an attitude of critical and cautious reserve, in order not to arouse deceptive hopes which must give place to bitter disappointment.

Artificial light treatment has of course been taken up as a new auxiliary by many sanatoria, and a number of physicians in charge of such institutions have published

experiences gained thereby. Opinion on the value of the treatment has without exception been favourable. It may be said without exaggeration that quartz light treatment applied to pulmonary tuberculosis, after the verdict of numerous expert physicians, has not seldom curative results which were striven for in vain by other means.

This is particularly true of decrease in temperature, which in many cases declined steadily, immediately after quartz light treatment was begun, from the point at which it had obstinately remained for months previously.

The behaviour of the weight is remarkable in pulmonary tuberculosis. Where malnutrition exists, irradiation almost always effects considerable increase of weight, often 20lbs, 30lbs., or even more. In some cases, however, we observe, in feverish cases, a tendency to unhealthy corpulence, particularly in subjects of fatty disposition. The contradiction is only apparent; where fever is present, the increased metabolic activity is expended in perspiration, while the combustion of fat is greatly decreased through lack of oxygen; hence the unhealthy increase in fat. In such cases, a sudden decrease of weight is presently observed, which is evidently the sign of increased fat-combustion, and which is experienced with great relief by the patient.

Expectoration, and bacillae in the sputum, often disappear under irradiation treatment; formation of blood is strongly stimulated, and the general condition most favourably influenced.

It appears to the writer that experiences of this description made with irradiation treatment ought to lead sanatoria in general to adopt sunlight treatment, natural and artificial, as one of their weapons, so far as this is not at present the case.

Those affected by the disease may with confidence hail light treatment with new hope, promising as it does relief, improvement, and in certain circumstances a cure. *It can, however, never be the duty of the consumptive on his own account to practise sunlight treatment, knowing nothing about it.* Their are certain dangers, hæmorrhage of the lungs, for example, which absolutely necessitate medical supervision. The object of these lines is to spread the knowledge of the wonderful healing power of sunlight, but equally to give an express warning against its use in unskilled hands.

In the same way, the other means of fighting tuberculosis remain unaffected by these attempts to introduce sunlight treatment into the campaign. Sunlight is no universal panacea, but only one weapon amongst many against consumption, although a very potent one. For the progressive diminution of this wide-spread plague, suppression of the many causative social factors is of the utmost importance. The questions of housing and food are primary ; damp and dark dwellings must be entirely abolished. Special mention must be made of the dark alcoves found in many dwellings ; can it be wondered at that tuberculosis is never extinguished in some families, when a " healthy " member takes over as sleeping-place the dark, bacillus-infested hole in which a consumptive predecessor has only just before coughed out his life ? Yet how often does not the doctor find such conditions as these in some districts ?

A further factor of vast importance is heredity. *Tuberculous parents ; scrofulous children ;* the conjunction is a law firmly established from experience. Maternal tuberculosis in particular is fateful for the children. Those of consumptive disposition ought to submit themselves to a rigorous medical examination before marriage, to test

their fitness. Then again, children should be most carefully guarded from contact with the tuberculous, or from infection by tuberculous sputum; over-niceness for the feelings of the sick is a sentiment which is absolutely out of place here.

The erection of a solarium (sunbath) can usually be arranged by the simplest means, as the possibility of sunbathing exists indeed in every spot where the sun shines. In large towns, following the Mediterranean example, flat roofs are particularly suitable, and have the great advantage that the air is pure in comparison with that of the busy streets. *In rebuilding hospitals in towns, a sunbathing terrace should always be provided for, and at least a portion of the structure built with a flat roof for this purpose.* It is a great drawback that as yet so few town hospitals offer the possibility of sun treatment. Open verandahs with a southern aspect are of course always suitable for sunbaths, as are also sunny places in garden or park, where the act of undressing is often sufficient to provide a solarium at no effort. Glazed verandahs which can be closed and heated at will, on to which beds can be moved during cool sunny days in autumn, winter and spring, are most advantageous. In many places public light and air bathing establishments exist, sometimes in combination with the public swimming baths. The provision of sun-baths from public funds should be forwarded by every possible means. During the winter a sunbath may be taken to advantage, especially by children, on a blanket before the open window of a warm room; in winter, indeed, conditions for sun treatment are particularly favourable, when fallen snow increases the intensity of light through reflection, and the number of sunny days in February and March is often large. In brief, where the

will exists, there is no lack of facilities for sun-bathing, although the need for artificial substitutes is also undeniable.

There are, as we have seen, three sources of light at our disposal ; mountain sunlight, sunlight in the plains, and the various kinds of "artificial sunlight." Of the latter, the quartz lamp devised by Dr. Bach has proved most serviceable up to the present.

V. Baldness.

The curability of any sort of baldness premises that the papillae of the hair are still alive ; if these have been destroyed by the scars of disease, the baldness is, of course, incurable. By means of a lens it can be determined with a fair degree of certainty whether this is the case or not. If the papillae are in a state of inactivity, they can be roused to resume their function by strong stimulation, X-rays and quartz light being among the most powerful means known. As the technique is a matter of medical practice, it will not be discussed in detail here.

Baldness is most frequently the result of scurf or dandruff of the scalp. This takes two forms : dry and greasy scurf. The condition is expressly hereditary ; if the father is bald, the children will show a tendency to scurf even in childhood.

If the scalp is peeling from the age of ten onwards, by the middle twenties it is as thin as paper, so that the hairs are only loosely rooted in their thin soil, and fall out. Harmful bacterial action also plays a part in the process. *Preventive treatment is of very great importance in this case ; from the age of ten onward the scurf must be treated with sulphur ointment.* Even later, however, quartz light radiation often suffices to prevent baldness.

Quartz light is most beneficial in cases of circumscribed baldness (*alopecia areata*). This form, consisting in the sudden appearance of one or several bald spots on the scalp, often leads to complete and permanent baldness. The eye-brows and beard may also be involved. In the initial stages, quartz light cures the disease speedily and in nearly all cases ; the older the condition, the slower the cure. Distance radiation with the Artificial Alpine Sun

Lamp is serviceable, *but still better is pressure treatment with the Kromayer Lamp, alternating the blue and clear lenses.* Circumscribed baldness is probably contagious, and care should therefore be exercised with combs, hats, towels, etc.

If baldness occurs as the result of some feverish condition such as influenza, natural or artificial sunbaths, combined with local irradiation of the scalp, are the most effective means of checking its course and promoting the growth of new hair.

VI. Flesh Wounds.

Natural and artificial sunlight, even applied locally, have most advantageous effects on the healing of external wounds. All the processes of healing are gently stimulated, the blood supply increased, while septic bacteria are destroyed, resulting in accelerated healing with a soft and pliant scar. If the wound is slow in healing through some internal cause, such as anæmia, tuberculosis, etc., sunbaths, natural or artificial, as a rule have a definite and beneficial effect on cicatrization.

VII. Metabolic Diseases.

In all the cells of the body, an active process of chemical change is continually going on ; complex substances are being broken down into simpler compounds, this being the meaning and significance of metabolism. The ingested protein is first divided in the blood into fat and urine-forming substances, and the fat so formed, or directly ingested, converted to carbonic acid and water by combustion with oxygen. The urine-forming substances are converted, through the action of the oxygen in the colouring matter of the blood, into uric acid and urine, the nitrogenous final product of albumen combustion.

If a deficiency of oxygen in the blood causes incomplete combustion of fat and albumen, fat and waste products accumulate in the circulation and are deposited in the tissues as nodes ; thus are caused the familiar metabolic diseases, obesity and gout.

Since irradiation, as we have seen, stimulates the combusive processes within the body, i.e., the consumption of oxygen and the excretion of carbonic acid, natural or artificial sunlight is an effective and welcome auxiliary in the treatment of these diseases. Irradiation cannot and should not exclude the other approved curative measures, such as work, physical exercise, restricted diet, and baths ; but it can do valuable service in the doctor's hands in the treatment of these and other metabolic disorders. The stimulated activity of the skin and the evaporation of perspiration alone are of great importance, since by these means, as is easily proved, the excess of uric acid can be expelled from the body.

VIII. Irradiation Technique.

In the application of sunlight to healing, the "technique" of irradiation treatment, a primary consideration is the content of the illuminant used in short-waved, ultra-violet rays. Sunlight in the plains is poorest in these, as the short-waved end of the spectrum is largely cut off by impurities in the lower atmosphere. At the seaside and in the pure air of high mountains sunlight is much richer in ultra-violet, and from this cause the danger of sunburn, as is well known, is much greater in these conditions. Quartz light has the richest content in short-wave rays; radiation of the skin of even a few minutes duration causes intense burning, and if the naked eyes are exposed to the light, painful conjunctivitis will result.

It can therefore be easily understood that the application of light for irradiation treatment varies considerably, according to which of these sources is used.

Rollier, of Leysin, allows his patients a few days to become acclimatised to the Alps before sunlight treatment is begun. A commencement is made by cautious exposure of the feet for a few minutes, next day the legs up to the knee, and on the third to the groin; the abdomen and chest are last irradiated, while the head is not exposed at all, protection being given by a broad brimmed hat. By this procedure Rollier contrives to accustom his patients gradually to the sharp Alpine sunlight, and effects a bronzing (pigmentation) of the body, progressing step by step, without allowing the skin to become burnt. When the skin is once bronzed, it can tolerate exposure for hours and days without harm. Rollier lays great stress on the strongest possible pigmentation, not only to arm the skin against the inflammatory stimulus of the ultra-violet

rays, but also because experience has shown that only a strong deposit of pigment in the skin warrants certain success in healing tuberculosis.

Using sunlight in the plains, the same result must be aimed at, only it is not necessary, in accustoming the body to our milder light, to take the same careful precautions. Even here, however, it is advisable to take air baths in or out of doors before the body is directly exposed to the sun. The first sunbath can then be prolonged to a quarter or half an hour without hesitation, according to the intensity of the light and the time of day ; midday being the best time. The body should be exposed, completely unclothed if possible, to the light on every side for a few minutes at a time, and the duration of the sunbath gradually prolonged to a half, three-quarters, an hour, and upwards to five hours. Owing to the rarity of long sunny periods in our climate, full use should be made of every sunny day. The desired bronzing of the skin will thus be easily achieved without fear of sunburn ; should, however, slight reddening of the skin occasionally occur, a break of a few days, during which the skin should be kept dry and dressed with salicylic powder, is sufficient to allow resumption without harm. During the winter every sunny day should be fully utilised, the sunbath being taken lying on a blanket before the open window of a warm room. Sun treatment can thus be continued with success throughout the winter, especially where children are concerned. The head and eyes should at all times be protected by a broad-brimmed hat.

Special precaution is necessary with the quartz light, owing to the powerful effect of its short-wave rays on the skin. The eyes in particular must be protected, either by goggles or by a dark cloth round the entire head. The

lamp is lit at a distance of $1\frac{1}{2}$ to 2 yards, and the body exposed, at first, on all four sides for a minute each at most. If reddening occurs, irradiation should be interrupted for a few days and the skin powdered (*v. supra*). Otherwise, the baths are continued and gradually prolonged from day to day, exposures running 2, 3, 4, 5, 6, 10, 20, and 30 minutes. The longest usual time for a quartz light bath is about 30 minutes, made up either of 15 minutes on the front and the same on the back, or exposure of all four sides for about 8 minutes each. At the same time, the distance of the lamp can gradually be reduced to about one yard. By this procedure the necessary bronzing of the skin is achieved without risk, after which the skin is protected against radiation of any intensity or duration. As a general rule, two or three such quartz light baths in the week are sufficient.

The skin can, however, be protected against the dangerous ultra-violet rays by other means than the slow process of pigmentation, i.e., by means of a light-filter, which intercepts the rays at the short end of the spectrum. This filter, the Uviol Screen, is blue in colour and transparent, and is supplied in large sheets mounted in a frame which is placed in front of the lamp. It allows only rays over 3,000 A.U. to pass, and so absorbs all dangerous, irritative light. Using this blue quartz light, prolonged light baths can be taken, lasting from a quarter to half an hour, from the beginning. Many will consider it an advantage, that under this filtered light the skin naturally bronzes little or not at all; the short, pigment-evoking rays being intercepted. Filtration with the Uviol Screen can also be applied to natural sunlight baths.

IX. Conclusion.

There are many people who have a strong prejudice against all medicaments which do not come from the druggist. Just as foolish as this is the opposite school, which expects cures to be accomplished by so-called "natural" means alone. Nothing is farther from the author's intention than to address himself to a one-sided and exaggerated solar fanaticism. Having confined myself to stating the assured scientific data of sunlight treatment, and the practical applications which naturally follow on these, I hope I have guarded against this, I am, indeed, an opponent of indiscriminate sunlight treatment practised by laymen without medical supervision. Pulmonary patients, especially those inclined to haemorrhage, those exhausted by nerve disease, and heart subjects, should only take sunbaths by medical advice and under medical supervision.

Emphasizing this restriction, however, I am decisively of opinion that both in health and disease we ought to make far more extensive use of the immeasurable wealth of sunlight showered upon us. Mothers, give your children sunlight ! It is strongly to be desired that every child, apart from being bathed in water, should have its sunbath once or twice weekly. Dress your bigger children in bathing drawers and let them play some hours in the sunlight, or even without direct sunlight on cloudy days provided the weather is warm ; to accustom their skin to air and diffused daylight will strengthen and harden them and improve the blood formation. Babies too, even in their first year, should not be deprived of the benefits of sunbathing ; after the daily bath, when the skin is cleansed and specially receptive to light, lay them for a few minutes in the sun.

Every housewife is careful to put out her pot plants into the sun, to adorn the house with blossom and perfume. Do not then deny sunlight to your children ! The offspring of tuberculous parents especially, or children of "scrofulous" disposition, should have superabundance of sunlight throughout their entire childhood. How much suffering and disease, tuberculosis, scrofula, lupus, and so forth, would be nipped in the bud ; how much benefit would spring from this for the individual and the nation ; cannot be measured. The present generation is growing up to a time of great and difficult tasks ; let air and sunlight make the children hardy ! For those who are already sick, however, particularly the tuberculous, sunlight will be a spring of new health and happiness in countless cases. Admittedly, the poverty of our climate in sunshine is no small obstacle in such endeavours. None the less, I maintain that the number of sunny days during the year is large enough, even in this country, to allow utmost advantage to health from their use, if carried out systematically.

In any case it is desirable that opportunities for natural and artificial sunbaths should be generally available as cheaply as possible, and the smallest cottage hospital should possess a sun verandah and a Quartz Lamp.

I go still further, however, and consider it desirable that "artificial sunlight" should be introduced also into the family. How easy it is to install a hanging lamp in the bathroom ! And what a source of health and vigour for the members, young and old, particularly when delicate children are concerned*. I cherish the conviction that sunlight treatment, natural and artificial, carried out regularly through the year, would dispense with many a costly

* I have already pointed out on p. 26 that a layman should consult his doctor before installing a Quartz Lamp, and not practice sunlight treatment on his own account.

hydro treatment. The manipulation of the "Artificial Alpine Sun" is so easily learned that any layman could work it without difficulty. May the slogan with which these pages open, and with which I end, find a ringing echo far and wide :

MORE SUNLIGHT !

X. Aphorisms.

The gold of healing can be found everywhere the sun shines.

* * * *

Phantoms brood in darkness ; light and life, brightness and happiness reign in the kingdom of the sun.

* * * *

The sunlight you give your children, their eyes give you again in sunny smiles of health.

* * * *

Open your hearts to the sun.

* * * *

It may be bad if the sun fades your carpets ; far worse is it if the colour fades from your children's cheeks through lack of sun. Let the sunlight into your home !

* * * *

A thatched roof overshadowed by spreading trees is a romantic picture ; but the cool, damp shade is good growing ground for the deadly night-shade of tuberculosis.

* * * *

Sun-funk is commoner than water-funk. Sunlight knocks, bangs, hammers at every door, streams in through chinks and crevices, yet "noon lulls us in a gloomy den, and night is grown our day." No one opens to it.

MORE SUNLIGHT !

Illustrations.



Fig. 1. Sunlight Treatment in the Foothills (Kappenaau, near Heidelberg.)

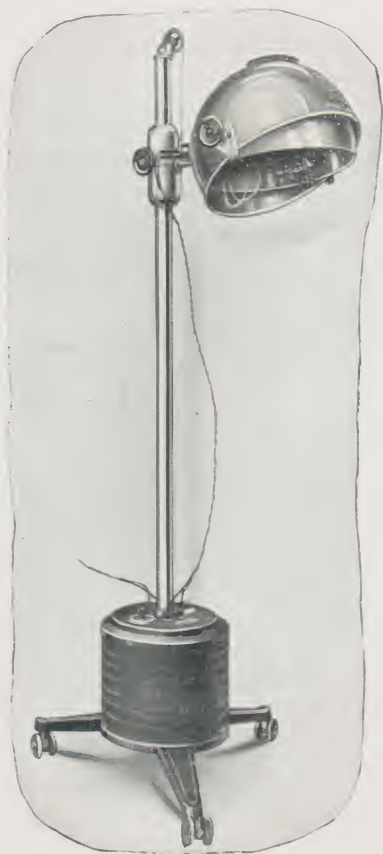


Fig. 2.
The "Artificial Alpine Sun" Quartz Lamp
Alternating Current Model.

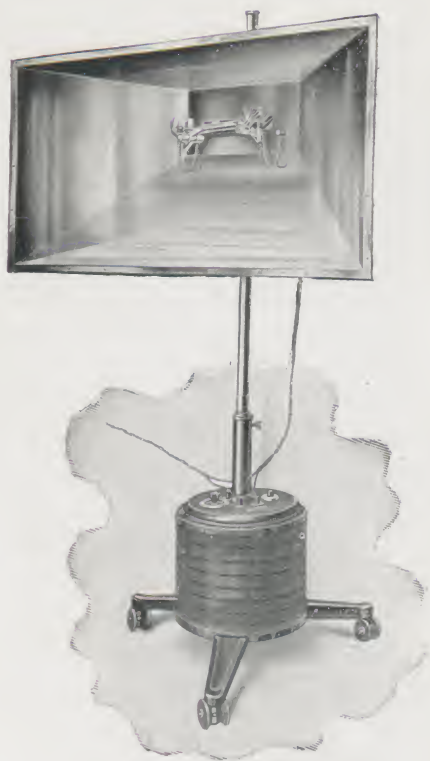


Fig. 3. The Jesionek Quartz Lamp.

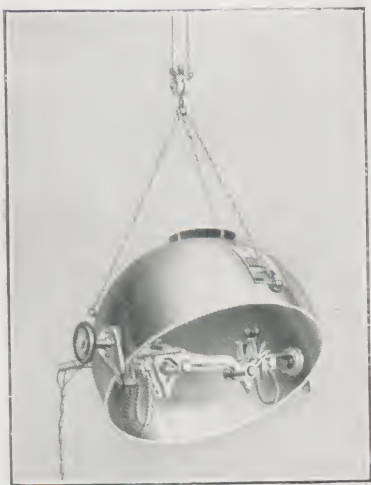


Fig. 4.

The "Artificial Alpine Sun,"
Simplified Suspension Model.



Fig. 5. Combined irradiation with Jesonek and Sollux Lamps
(Bad Elster Sanatorium).



Fig 6. The Blue Uviol Filter for the "Artificial Alpine Sun."

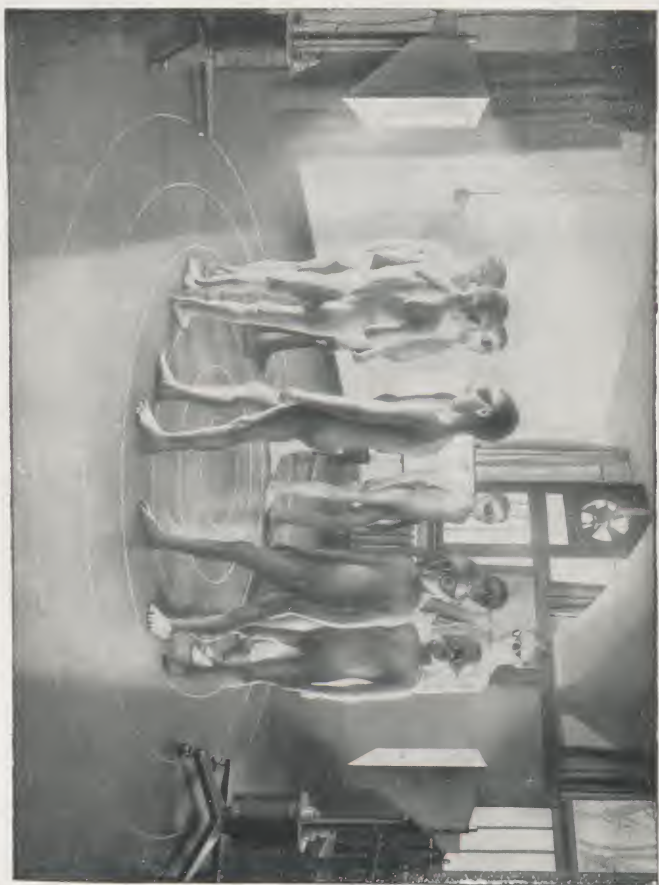


Fig. 7. Irradiation with Jesionek Lamps (note circles regulating distance).



Fig. 8. Tuberculosis, before treatment.



Fig. 8A. The same, after treatment.



Fig. 9. Tuberculosis, before treatment.



Fig. 9A. The same, after treatment.



Fig. 10. Tuberculosis, before treatment.



Fig. 10A. The same, after treatment.



Fig. 11. Tuberculosis, before treatment.



Fig. 11a. The same, after treatment.



Fig. 12. Flesh Wound,



Fig. 12A. The same, cured by Quartz Light.



Fig. 13. Flesh Wound.



Fig. 13a. The same, cured by Quartz Light.



Fig. 14. Case of Lupus.



No. 14A. The same, after Light Treatment.



No. 15. Case of Lupus.



No. 15a. The same, after Light Treatment.



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